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# TRANSLATION

MAGNETOMETER

By

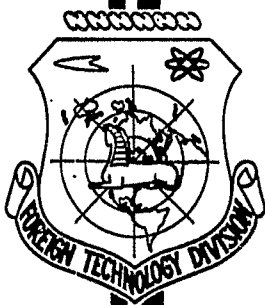
N. N. Zatsepin

## FOREIGN TECHNOLOGY DIVISION

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## UNEDITED ROUGH DRAFT TRANSLATION

MAGNETOMETER

BY: N. N. Zatsëpin

English Pages: 4

SOURCE: Russian Patent Nr. 144546 (Appl. Nr.  
676266/24, 12 Aug. 1960), 1960, pp  
1-3

S/19-62-0-3

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## MAGNETOMETER

By

N. N. Zatsepin

As is known, magnetic probes, highly sensitive elements, have found wide use for solving the most varied problems in the field of practical physics and technology, especially in the form of magnetometers for measuring weak magnetic fields.

The sensitivity of magnetometers ordinarily used depends on the magnetic penetrability of the body (form) of the core of the element, and also on the system of working.

When the circuit of the magnetic probe works in the resonance system on Q-factor of the in- the second harmonic its output emf is proportional to the ductor circuit. For probes with long cores and low demagnetizing factor practically the required sensitivity can be assured. This particularly applies to the field of those problems where measurement is made of a uniform magnetic field. In the measurement of the latter the dimensions can be in principle of any kind since this does not effect the precision of the measurement.

In practice, for example, in magnetic defectoscopy, geophysics, etc., the necessity often arises for measuring an essentially nonuniform magnetic field. The peculiarity of the measuring of such field consists in the fact

that the probe neutralizes it. In order that the measurement of the magnitude vary little from the intensity of the field at a fixed point it is necessary to use probes of small dimension the magnetic penetrability of the body (form) of which drops sharply as a result of the increase in the demagnetizing factor of the core. This is one of the causes of the sharp drop in the sensitivity of such probes.

Another less important cause affecting the lowering of the sensitivity is the problem, which in practice is difficult of solution, of obtaining an indicator winding of a sufficiently high Q-factor.

The problem of increasing the sensitivity of the magnetometer consisting, just as the ordinary magnetic probes, of a rectilinear rod and material with great initial magnetic penetrability, provided with a magnetizing winding of AC, is solved in accordance with the invention, by placing the probe in a through opening of the central rod of the closed three-rod core, made, for example, of magnetodielectric, provided with a measuring winding.

In Fig. 1 there is shown a vertical cut of the proposed magnetometer; in Fig. 2 a view from the top.

The rectilinear rod 1 of the probe made of material with great initial magnetic penetrability and provided with a winding, placed over its whole length, for magnetization 2, located in a through opening of the central rod of the three-rod core 3, made of ferrite or magnetodielectric. For substantial increase in the magnetic flux of dispersion the central rod has two openings 4 for locating the measuring winding.

The particular merits of the proposed magnetometer are these: sensitivity considerably greater than in the case of ordinary magnetometers, designed on the type of magnetic probes, such sensitivity being heightened by the Q-factor of the measuring winding; practical absence of fields of dispersion, which

in the measurement of weak magnetic fields distort the real topography of the field; sensitivity only to fields which act in a volume of a very small dimensions of the opening of the core in which the exciter is located; possibility of accomplishing a smooth regulation of the level of disturbances (and background); and also lowering it to the minimum value, so that the maximum output emf of the signal (without amplification) exceeds the emf of the background by a factor of a thousand or more.

The effectiveness of the proposed magnetometer is confirmed by tests conducted in the Ural Branch of the Academy of Sciences of the USSR in the Institute of the Physics of Metals.

#### Object of the Invention

A magnetometer designed on the type of a magnetic probe, consisting of a rectangular rod of material with great initial magnetic penetrability, provided with a magnetizing winding of AC, which is distinguished by the fact that for the purpose of increasing the sensitivity of the magnetometer a probe is included in a through opening of the central rod of a closed three-rod core, made, for example of magnetodielectric and provided with a measuring coil

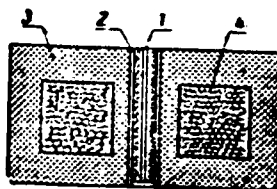


Fig. 1

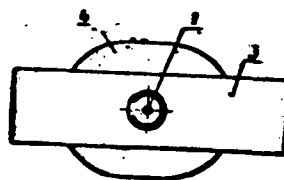


Fig. 2

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